

What is claimed is:

1. A high performance inducer for pumping cryogenic two phase fluids from reservoirs comprising:

a hub including a first portion having a first diameter and a second portion having a second diameter larger than the first diameter;

a plurality of primary blades circumferentially disposed about the hub; and

a plurality of secondary blades circumferentially disposed about the hub, each secondary blade being interposed between two primary blades.

2. The invention of claim 1 wherein the hub increases in diameter from the first portion to the second portion.

3. The invention of claim 2 wherein a radial depth of the plurality of primary and secondary blades is substantially greater at the first portion of the hub than at the second portion of the hub.

4. The invention of claim 2 wherein an outer diameter of each primary blade and each secondary blade is generally constant from a leading edge to a trailing edge of said primary and secondary blades.

5. The invention of claim 1 wherein the first portion includes a generally rounded end and a sidewall extending both radially outward and axially from the rounded end.

6. The invention of claim 5 wherein the sidewall has a general curvilinear

conformation.

7. The invention of claim 1 wherein the primary blades have a general helical conformation.

9. The invention of claim 7 wherein the primary blades extend circumferentially about the hub generally 180 degrees from a leading edge to a trailing edge thereof.

10. The invention of claim 7 wherein a leading edge of each primary blade is circumferentially spaced generally 120 degrees from a leading edge of an adjacent primary blade.

11. The invention of claim 7 wherein a leading edge of each secondary blade is circumferentially spaced generally 60 degrees from a leading edge of an adjacent primary blade.

12. The invention of claim 11 wherein a circumferential extent from a leading edge of each secondary blade to a trailing edge thereof is generally 150 degrees.

13. The invention of claim 1 wherein the primary blades and the secondary blades have a thickness that tapers from a leading edge of said primary and said secondary blade to a substantially constant thickness over the remaining circumferential extent of said primary and said secondary blades.

14. A high performance inducer of a downhole pump assembly for pumping a liquefied gas stored in a reservoir that includes two phase fluid components, the high performance inducer comprising:

a hub including a first portion having a first diameter and a second portion having a second diameter larger than the first diameter;

a plurality of primary blades extending from the hub having a generally helical conformation circumferentially disposed about the hub;

a plurality of secondary blades extending from the hub interposed between the plurality of primary blades; and

wherein the depth of the plurality of primary and secondary blades is substantially greater at the first portion of the hub than at the second portion of the hub.

15. The invention of claim 14 wherein the hub increases in diameter from the first portion to the second portion.

16. The invention of claim 14 wherein an outer diameter of each primary blade and each secondary blade is generally constant from a leading edge to a trailing edge of said primary and secondary blade.

17. The invention of claim 14 wherein the primary blades and the secondary blades have a thickness that tapers from a leading edge of said primary and said secondary blade to a substantially constant thickness over the remaining circumferential extent of said primary and said secondary blade.

18. In a submersible pump of the type used to pump a two phase liquid

from a cryogenic storage system, an inducer impeller for pumping a two phase fluid comprising:

a hub including a first portion having a first diameter and a second portion having a second diameter, wherein the hub increases in diameter from the first portion to the second portion;

a plurality of axially extending primary blades having a general helical conformation circumferentially disposed about the hub and a leading edge extending radially and axially from the hub;

a plurality of axially extending secondary blades circumferentially disposed about the hub such that one of the secondary blades is interposed between two adjacent primary blades; and

wherein an outer diameter of each primary blade and each secondary blade is generally constant from a leading edge to a trailing edge of said primary and said secondary blade.

19. The invention of claim 18 wherein the depth of the plurality of primary and secondary blades is substantially greater at the first portion of the hub than at the second portion of the hub.

20. The invention of claim 18 wherein the vapor-to-liquid ratio (V/L) of the pumped fluid is up to about a 1:1 ratio.